

Application of Inventory Management Techniques and Operational Performance of Small and Medium Scale Enterprises (SMSES) in Anambra State

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ABSTRACT

This study ascertained if effective application of inventory management techniques enhanced operational performance of SMSEs in Anambra State. The objective of the study was to establish the relationship between inventory management techniques and operational performance of Small and Medium Scale Enterprises in Anambra State. Two research questions guided the study and two null hypotheses were tested at 0.05 level of significance. The study used Resource Based Theory view to provide understanding on the variables. A descriptive survey research design was adopted for the study. The population of the study consisted of 483 Managers of Small and Medium Scale Enterprises registered with Anambra States Ministry of Commerce and Trade as at December 2021. A structured questionnaire was used for data collection. The questionnaire was validated by experts. Two research questions guided the study and two null hypotheses were tested at 0.05 level of significance. The study used Resource Based Theory view to provide understanding on the variables. From the correlation, a relationship R-value of 0.963 with a coefficient of determination was obtained, showing a positive relationship. The regression analysis equally indicated that a unit increase in the application of the inventory management enhanced operational performance of SMSEs in Anambra State. Also, a relationship R-value of 0.963 with a coefficient of determination was obtained, showing a positive relationship. The regression analysis equally indicated that a unit increase in the application of the inventory management techniques results to a positive increase in the operational performance indicators. The study therefore recommends among others, that SMSEs in Anambra State should incorporate the use of the techniques in their supply chain to avoid the spread of unnecessary cost from supply chain cost centers to other areas of the firm.

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KEYWORDS: Inventory Management Techniques, Operational Performance; Small and Medium Scale Enterprise

INTRODUCTION

Small and medium scale enterprises (SMSEs) form a large part of the economy and are the drivers of socio-economic development in any country. They account for a greater percentage of all businesses in virtually all economies and generate the majority of private sector employment and output. SMSEs contribute to improved standard of living, substantial local capital formation, and achieve high levels of productivity and capability for individuals and nations. SMSEs play

very important roles in the process of employment creation, industrialization process, provision of personalized services and sustainable economic growth (Mandah, 2012; Tenungwa, 2012; Kehinde, Abiodun, Odegbuniji & Olademeji 2016).

Despite the positive outlook and growth trends of the sector, SMSEs in Nigeria, as in most developing economies, are facing intensive competitions as

business operations and environment changes, to this effect organizations has focused on competitive advantage and in response must develop effective techniques and practices that can affect their survival and performance positively. For SMSEs to be competitive and successful, they must have a supportive organization structure, maximize customer focus, invest in skills, embrace technology and artificial intelligence, calibrate inventory and engage in research and development. Inventory oriented SMSEs must consciously choose ways of enhancing performance and creating more values in inventory handling and forwarding. Effective management of inventories can increase the profit of a business and as well add to its return on total asset.

Inventory management technique refers to the various systems and methods applied in tracking and controlling inventory orders. The management techniques applied in a particular business enterprise will guide managers on how much goods to re-order, when to re-order the goods, how frequent orders should be placed and the appropriate safety stock to be held (Ololuwaju, 2013). Inventory management has an impact on all business functions particularly operations and marketing. Thus, the three motives of holding inventories are transactionary, precautionary and speculative motive. Ogbo, Onekanna and Ukpere (2014) stated that whatever the purpose for which inventory is kept, a business organization must exercise caution to avoid loss. Therefore, suitable inventory management techniques that meet the economic reality of a particular business organization must be applied.

A number of systems and techniques have been developed in the field of operations management to deal with inventory problems. Such management-oriented techniques include just-in-time (JIT), materials requirements planning systems (MRP) and enterprise resource planning (ERP). Others are electronic data interchange (EDI), strategic supplier partnership (SSP) and vendor-managed inventory (VMI) (Timothy, Patrick, Nabet and Virginia, 2013). Similarly, Daniel and Assefa (2018) identified the following as techniques for managing inventory; economic order quantity (EOQ), vendor-managed inventory, just-in-time and ABC analysis. Fashaya and Thanasak (2017) also listed the following as inventory management techniques:- vendor-managed inventory (VMI), enterprise resource planning (ERP), lean procurement (LP), just-in-time (JIT), economic order quantity (EOQ), inventory classification, materials requirement planning (MRP), forecasting, stock counts, and inventory rationalization. In managing inventories the firm's objective should be

in consonance with the wealth maximization principle. To achieve this, the management should be conversant with the following inventory management techniques:- inventory level technique (IL), purchasing control technique (PC) and economic order quantity (EOQ) (Onwuliri, 2013). Through proper inventory management techniques firms can establish optimal productivity that can lead to sound operational performance.

Operational performance refers to the measurable aspects of the outcomes of an organisation's process such as reliability, production cycle time and inventory turns (Azim, Ahmed and Khan, 2015). Operational performance looks at firm's proficiency in delivering results. Operational performance of a firm can reveal the efficacy and effectiveness of the firm's inventory management techniques while an SMSE's ability to meet customer demands by adequately supplying quality finished goods, eliminating waste and reducing lead time reflects a good operational performance. Based on the foregoing, this research explored on application of inventory management techniques and operational performance of SMSEs in Anambra State.

Statement of problem

In spite of all the efforts and supports of governments and multilateral institutions, SMSEs have not been able to make the desired impact on the Nigeria economy. Reports have shown that a good number of SMSEs shut down annually (Mohamed, Balarabe & Salwa, 2016). Unfortunately some of the major reasons for this shut down include inventory related problems. Various Scholars both international and local has undertaken studies on inventory management and operational performance but none of these studies linked inventory management techniques to the operational performance of small and medium scale enterprise in Anambra State. Many have dealt with inventory management but on different context, hence the research gap. This study will seek to bridge this gap.

Objective of the study

The main objective of this study was to find out the effect of inventory management techniques on operational performance of SMSEs in Anambra State. Specifically the study:

1. Determined the extent to which SMSEs in Anambra State apply inventory management techniques.
2. Established the relationship between inventory management techniques and Operation performance of SMSEs in Anambra State.

Review of the Related Literature

Conceptual Framework

Inventory

Inventory is one of the most visible and tangible aspects of doing business. It is a term which Americans use for stock that are kept or stored for use as the need arises. Hamza, Zubieru and Stephen (2015) defined inventory as an idle stock of physical goods that contain economic value, and are held in various forms by an organization in its custody awaiting packing, processing, transformation, use or sale in future. Raw materials, goods in process and finished goods all represent various forms of inventory. Inventories are the major items of input in any organization and as such, suitable inventory techniques must be adopted to ensure maximum profit.

Inventory Management Techniques

Timothy, Patrick, Nebat and Virginia (2013) defined inventory control techniques as a science based art or measures of managing the amount of stock held in various enterprises (small and medium scale) to economically meet the demands placed on it. David (2017) defined inventory control techniques as the various systems and means used in an enterprise to control the enterprises' investment in stock, which deal with recording and monitoring of stocks levels, forecasting future demands and deciding when and how many to order. Inventory management techniques are used to achieve high inventory turnovers and to avoid excess stock, inventory discrepancies, stocks-out, and other issues associated with inventory management (Khader, Rekik, Botta-Genoulaz & Campagne, 2014; Fashaya & Thanasak, 2017). The techniques to be considered in this study include Pareto Analysis (ABC), Periodic Review (PR) and Vendor Managed Inventory (VMI). ABC Analysis classifies inventories into groups based on the total annual expenditure for or total stockholding cost of each item (Eze and Uchenu 2020). Period Review reviews physical inventory at specific time interval of time and orders the quantity order as many as the maximum level of inventory (Wakid and Cucuk, 2014). VMI gives the supplier responsibility and authority to manage the entire inventory replenishment process (Timothy, Patrick, Nabat and Virginia, 2013). The implementation of these techniques ensures the entire supply chain realizes smooth flow and functioning of value addition activities (Miller, 2010).

Operational Performance

Operational performance is described a measure of how well a firm uses its assets from its core operations and generates revenues over a given period of time. This measure is thus compared to some given

industrial average standard of similar firms in the same industry (Mwichigi & Waiganjo, 2014). Operational performance encompasses production reliability and defect rates, production cycle time, on time delivery, cost of quality and scrap minimization, productivity, and inventory (Malonza, 2014). According to Maestrini, et al. (2017) operational performance refers to "set of metrics used to quantify the efficiency and effectiveness of supply chain processes and relationships, spanning multiple organizational functions and multiple firms and enabling supply chain orchestration". In addition to this, Amarjit et al. (2016) described a firm's operational performance as a measure of how well a firm uses its assets from its core operations and generates revenues over a given period of time. This measure is thus compared to some given industrial average standard of similar firms in the same industry. In the same vein, Hwang et al. (2014) perceived operational performance as firm's performance measured against standard or prescribed indicators of effectiveness and efficiency. Operational performances are measured by either financial or non-financial indicators with preference made on either depending on industry and organisation's structure (Murthy & Sree in Bett 2018). Financial measures of operational performance are proposed by this study and is expressed by stock turn rate, return on investment (ROI), annual stock out and total inventory handling cost.

Small and Medium Scale Enterprises (SMSEs)

In Nigeria and worldwide, there seems to be no specific definition of small and medium scale business. Different authors, scholars and schools of thought have different ideas as to the differences in capital outlay, number of employees, sales turnover, fixed capital investment, available plant and machinery, market share and the level of development. Others also defined SMEs in terms of method of production and legal status (Abor & Quartey, 2010). These features usually vary from one country to the other. The definition by the European Union combined the number of employees, turnover/sales volume and capital employed. The European Union in Klaus-Heiner (2017) defined SMSEs as enterprises which employ fewer than 250 persons and which have an annual turnover not exceeding 50 million euro. This definition seems to be more encompassing.

In Nigeria various agencies have given different definitions based on different policies. The Nigerian Bank for Commerce and Industry in Okorie (2010) defined SMSEs as firms with a total investment (excluding cost of land but including capital) of up to ₦750,000 and paid employment of up to fifty persons.

The Nigerian Federal Ministry of Industries guideline in Onyenekwu (2016) defined SMSEs as businesses with a total cost not exceeding #500,000 (excluding cost of land but including working capital). The Nigerian Industrial Development Bank (now Bank of Industry) defined SMSEs as businesses with investment and working capital not exceeding #750,000 (Imosi& Ephraim, 2015). These definitions have common measures like assets and number of employees.

The high operational cost of doing business presently in Nigerian has modified the criteria for SMSEs. The Central Bank of Nigeria (2010) defined SMSEs in Nigeria according to asset base and number of staff employed. The criteria is between #5million to #500 million and a staff strength that is between 11 and 100. The National Economy Reconstruction Fund (NERFUND) in Ilori, Ilori and Zenith Bank (2015) defined SMSE as businesses which its fixed assets other than land including the cost of investment project, does not exceed #10million. The National Council of Industries in Eniola (2014) described SMSEs as business enterprises which cost excluding land is not more than two million naira (#2,000,000). The Small and Medium Scale Enterprises Development Agency of Nigeria (SMEDAN) (2013) defined SMSEs as those businesses with assets of not more than #50million (excluding cost of land but including working capital) and not more than 100 employees.

Theoretical Background

Resource-Based View Theory

The Resource based View theory (RBV) was developed by Penrose (1959) with the aim of evaluating an organization's competitive edge using a particular or set of resources and capabilities. The resource s might be traditional or innovative. The traditional in this case refers to those that form the core input. While the innovate ones refers to those that complement the traditional ones. According to Barney the focus on resourceful organisational resources and capabilities by RBV enhances the creation of sustainable competitive advantage. RBV does not only depicts but also provides knowledge on how to identify these resources and capabilities. From the notion of identification and exploitation provided by the theory, it is assumed that firms that emulate RBV assure themselves of superior and long term performance.

In SMSEs operation the theory shows and justifies how inventory management techniques can be used as a capability and a resource to reduce waste and enhance value. RBV shows how SMSEs use

inventory management techniques to better their competitive Advantage.

Empirical Review

Anichebe and Agu (2013) investigated the effects of inventory management on organizational effectiveness in selected organizations in Enugu. Three research questions guided the study and three null hypotheses were tested. Descriptive survey research design and case study were employed in carrying out the study. A sample size of two hundred and forty-eight (248) was derived using the Taro Yamane formula for sample size determination from a finite population. Findings revealed that irrespective of the fact that the organizations studied, painted the picture that they applied the tenets of good inventory management, they from time to time run into the problems of inventory inadequacy. The findings also indicated that there was a significant relationship between good inventory management and organizational effectiveness; inventory management has a significant effect on organizational productivity.

Olowolaju (2013) assessed the inventory management practices in small and medium scale enterprises in South-West Nigeria. Three research questions guided the study. Descriptive survey research design was used for the study. A sample of 320 organizations was selected within the states through purposive sampling technique. Questionnaire and oral interview techniques were adopted for data collection in the study. Simple percentage was used to analyze data collected. The study discovered that there was a wide gap between theory and practice of using economic order quantity model.

Methodology

A descriptive survey research design was adopted for the study. The researchers considered this design appropriate for this study in answering the what, which and how of inventory management techniques and operational management in SMSEs. Descriptive survey is highly effective in seeking to establish the status of a process Mugenda and Mugenda, 2003). The population of the study consisted of 483 Managers of SMSEs registered with Anambra State Ministry of Commerce and Trade (SME unit) as at December 2021. The study was carried out in Anambra State. A structured questionnaire designed with the objectives of the study was used for the study. The instrument was validated by experts.

The administration of the instrument was carried by the researchers and 10 research assistants. Data collected regarding the research questions was analyzed using, descriptive statistics and Multiple Linear Regression Analysis.

Presentation and Analysis of data

This chapter presents the statistical analysis of the data collected in tables according to research questions and null hypotheses as follows:

Table 1: Extent of Inventory management applied by SMSEs in Anambra

Grouping inventories into different categories with ABC	4.47	0.73
Exercising strict control over inventory with very high monetary value through ABC	4.30	0.70
Reducing the complexity of managing the vastness of a company's inventory with ABC	4.22	0.90
Designing models and establishing control practices geared to certain groups of items with ABC	4.21	.67
Counting inventory at specific intervals with periodic review	4.21	.90
Placing orders at fixed intervals through periodic review	4.13	1.01
Determining the quantity to be ordered by reviewing demand trend for usage of the item concerned	3.86	0.96
Having a system is deterrent to fraud as a result of periodic stock taking.	3.74	0.96
Involving suppliers early in product design process through VMI	3.48	.0.93
Use of suppliers to manage inventory on behalf of the firm (VMI)	3.47	.0.92
Frequent meetings between firm's inventory staff and the suppliers	3.88	0.98
Complete information sharing between the firm and its suppliers	4.47	0.73
GRAND MEAN	4.04	

Source: Field Survey (2023)

The table above shows the extents to which respondents from various SMES agreed on application of inventory management techniques. A mean 4.47 agreed to be using Pareto Analysis (ABC) in grouping inventories into different categories, a mean of 4.30 agreed that they use ABC to exercise strict control over inventory with very high monetary value, a mean 4.22 agreed that they use ABC to reduce the complexity of managing the vastness of a company's inventory, A mean of 4.21 agreed that ABC is used to design models and establish control practices geared to certain groups of items in their firms. A mean of 4.21 agreed to be counting inventory at a period interval through of period review in their firms, a mean of 4.13 agreed to be placing orders at fixed intervals through periodic review, a mean of 3.86 agreed that they determine the quantity to be ordered by reviewing demand trend for usage of the item concerned, a mean of 3.74 agreed that their system is deterrent to fraud as a result of periodic stock taking through periodic review. A mean of 3.48 agreed that they involve suppliers early in product design process through VMI. A mean of 3.47 agreed that they use suppliers to manage inventory on behalf of the firm (VMI) , a mean of 3.88 agreed that they have frequent meetings between firm's inventory staff and the suppliers (VMI), mean of 4.47 agreed that through vender managed inventory practice that there complete information sharing between the firm and its suppliers . In the above analysis a grand mean of 4.04 shows a high extent of application of inventory management techniques by SMEs in Anambra State.

Operational performance

The effect of inventory management techniques on operational performance was also sought out with the use of performance indicators, Respectively responses were analysed and summarized in the table below:

Table 2: Impact of inventory management techniques on Operational Performance

Indicators	X	SD
Reduced stock -out rate	4.89	0.95
Increased return on investment	3.99	0.88
Reduced inventory holding cost	4.69	0.78
Enhance stock-out rate	4.91	0.89
GRAND MEAN	4.62	

Source: Field Survey (2023)

From the analysis above SMSEs in Anambra are gaining a lot from applying inventory management techniques. From the calculated mean SMSEs were able to reduce stock-out rate by a mean of 4.89, increased return on investment by a mean of 3.99, reduced inventory holding cost by a mean of 4.69 and enhanced stock-out rate. Observation from the mean shows clearly that application of inventory management techniques had a high influence on operational performance of SMSEs in Anambra State. This is justified by a grand mean of 4.62.

Inferential Statistics

The following regression model was applied to measure the relationship between application of inventory management and operational performance of Small and medium Scales Enterprises in Anambra State.

The regression model was as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Y=Operational Performance

β_0 = The Constant, the value of Y when all X values are zero.

β_i = beta coefficient

X1 = Pareto Analysis (ABC)

X2 = Periodic Review

X3 = Vendor managed inventory

ε = the error term (To account for all other Variables not considered in the study), assumed to be normally distributed with mean zero and constant variance.

The regression was carried out between the dependant and independent variables. The independent variables includes Pareto Analysis (ABC Analysis) Periodic Review and Vendor managed Inventory (VMI) while operational performance represents the dependant variable.

Table: 3 Regression Analyses

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	.991	.694		.310	.000
Pareto Analysis	.228	.056	.212	.4.084	.000
Periodic Review	.090	.023	.074	3.951	.000
Vendor Managed Inventory	.987	.044	1.186	22.609	.000

The following regression analysis was obtained

$$Y = 0.991 + 0.228X_1 + 0.090X_2 + 0.987X_3 + 0.694$$

Where Y is operational performance, X1 is Pareto Analysis, X2 is Periodic Review and X3 is Vendor Managed Inventory. The model illustrates that when all variable are held at zero(constant) the value operational performance will be 0.991, However holding other factors constant, a unit increase in Pareto Analysis (ABC) would lead to 0.228 increase in operational performance, a unit increase in Priodic Review would lead to 0.090 increase in operational performance and a unit increase in Vendor Managed Inventory would lead to 0.987 increase in Operational Performance. This suggests that when Pareto Analysis, Periodic Review and Vendor Managed Inventory is applied in the operations of SMSEs Operational Performance will increase positively.

The study further shows that there is significant relationship between operational performance and Pareto Analysis (p=000) Periodic Review (p=000) and Vendor Manged Inventory (p=000)

Table 4: ANOVA on Dependent and Independent Variable

ANOVA^a

	Model	Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3302.939	3	1100.980	1028.497	.000 ^b
	Residual	256.914	240	1.070		
	Total	3559.852	243			
a. Dependent Variable: Operational Performance						
b. Predictors: (Constant), Pareto Analysis (ABC), Periodic Review, Vendor managed inventory						

The study used ANOVA to establish the significant of the regression model from which an F- significant value of p=<0.000 was established

Table 6: Modal Summary of variables

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.963 ^a	.928	.927	1.03464
a. Predictors: (Constant), Supplier Partnership, Staff Competency, Procurement Planning				
b. Dependent Variable Tertiary institutions Performance.				

A correlation value of 0.963 was established which shows a high relationship between the dependant and independent variables. This a also shown by a coefficient of determination value of 0.928.

Discussion Findings

From the analysis there was a high agreement on the use of Pareto Analysis (ABC) in determining products with priority in the operation room and as well controlling firm's stock as per value. They were also a high agreement on frequent stock stocking and having a system deterrent of fraud through Periodic Review. From the survey most of the SMSEs uses VMI to track stock and reduce unnecessary cost, they moderately agreed to be keeping track of healthy relationship with vendors through VMI.

Under the impact of inventory management application, the study revealed that it greatly has impact on reducing stock-out rate which again increased the return on investment of many SMSEs. Also the SMSEs has greatly reduced their inventory holding cost and as well enhance their stock turn rate. The Use of ABC was established with many of the SMSEs purchasing various materials depending on the priority sheet notes. The quantities to be ordered by reviewing demand trend for usage of the items concerned were determined through periodic review techniques. Communication and collaboration with suppliers and distributors was highly effective as VMI provided guidance

The study further revealed that inventory management techniques are responsible for operational performance indicators of the firms. The effect is said to be at a higher extent. The study established that the firms recorded better stock-turn rates over the years of application of inventory management techniques. At the same time when stock-turn rate was improved, stock-out rate was found to be declining, The cost of holding inventory also decreased which include cost of storage of already produced goods and raw materials. From the combination of all the indicators of operational performance, the effect on return on investment was highly positive. This was ascertained by assessing the contributions of the outcomes to the final profits against the cost of running and maintaining the techniques.

Using a multiple regression model, the data obtained from the respondents were used to regress application of inventory management techniques against operational performance of the Firms. The analysis on the relationship between application of inventory management techniques and operational performance revealed that an overall significant relationship of ($p=1.035$) was attained. All the three inventory management techniques employed in the study were found to be positively related to operational performance. The model was found to be significant; all the three techniques (Pareto Analysis, Periodic

Review and Vendor managed inventory) were to be significantly related to operational performance given a p-value less than 0.05. From the analysis, inventory management techniques was regressed against operational performance as a whole. A correlation value of 0.963 which shows a very high relationship between the dependent and independent variables. This is also shown by a coefficient of determination of 0.928.

Conclusions and Recommendations

From the findings of the study, it was concluded that application of inventory management techniques has positive impact on the operational performance of SMSEs in Anambra State. Generally the techniques are effective in handling inventory costs and other targets. Their combined effects on operational performance impacts overall implementation costs.

The study therefore recommends that SMSEs in Anambra State should incorporate the use of the techniques in their supply chain to avoid the spread of unnecessary cost from supply chain cost centers to other areas of the firm. This is based on the assumption that cost from one stage reflects in another stage in terms of quality and price. In other to reduce waste and cost on the entire process, one has to ensure that internal practices respond positively from edge to edge and VMI can be used here.

The study further recommends that techniques implantation and maintenance should go together. Implementation of the techniques by the SMSEs is not enough to make the required impact and so a couple of supportive practices should be initiated. Trainings on the usage and maintenance of the techniques is a major determinant of the outcome.

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